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AN ANALYSIS OF THE CATCHES OF THE CHARTER BOAT, MELE MOKU

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INTRODUCTION

In recent years, the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service (NMFS) has shown increased interest in research on marine recreational fishing in Hawaii. Unlike commercial fishing, where much information has been obtained by State and Federal agencies, there are practically no catch and operational data available for the marine recreational fishery in Hawaii. A few records are being kept of billfish tournaments such as the Hawaiian Billfish Tournament and the Hawaiian Invitational Billfish Tournament, but these are catches from individual tournaments only and do not include all of the troll fishery catch and effort. The Hawaii Fishing News publishes fish catch reports which include a large portion of the billfish catch, but do not encompass the total catch and effort made by charter boats. In the recreational fishery for bottom fish, catch and effort information is almost nonexistent. The NMFS is, therefore, looking for sources of fishing data which may help in monitoring the various recreational fisheries, and enable the recommendation of measures to ensure optimum utilization of the important species being caught. We hope to use such operational and catch information summarized in this report as part of monitoring the charter boat community in Hawaii.

The Mele Moku is a 13.1 m (43-ft) charter fishing boat based in Pearl Harbor and operated by the Hickam Air Force Base Morale, Welfare, and Recreational Division for use by personnel of the Department of Defense. It is managed by Lou Foster, the harbor master of the Hickam Air Force Base Small Boat Harbor and operated with nonappropriated funds. With the cooperation of Lou Foster and Captain Kenneth Brunst, we were able to extract operational and catch data from the Mele Moku's official logbooks. The captain also made his personal logs available to us.

Since this report includes the analysis of catch per unit effort, for uniformity the data used were only those obtained when the regular captain operated the vessel. Therefore, this report summarized the trolling catches and operational data of the Mele Moku only when operated by the regular or full-time captain from 1977 through 1982. The summaries of operational and catch data including all captains from April 1979 through 1982 are presented in the Appendixes.

OPERATIONS

During the 1977-82 period, the Mele Moku was normally operated on a schedule of a 6-day week, weather permitting and if the boat was chartered. Tuesdays were set aside for maintenance, but there were 7-day charters at times. Occasionally the vessel remained in port for prolonged periods for repairs or other reasons.

For a charter involving trolling, a flat fee of \$180 was charged for a maximum of six people. These trips normally began at 0700 and ended at 1400. The captain operated the boat by himself, but on occasion took on a volunteer crewman when there were five or fewer people in the party. On rare occasions the boat was chartered for bottom fishing, and on such

occasions the fishing time was decided by the captain and those chartering the boat.

Area of Operation

The vessel operated mostly in the lee of Oahu in a triangular area bordered by Penguin Bank to the east, an area a few miles off Barbers Point to the southwest, and the entrance to Pearl Harbor. The trolling "legs" did not extend beyond 30 nmi in any direction starting from the entrance to Pearl Harbor.

Trolling Gear

Trolling was conducted with six lines while maintaining speeds averaging 8-9 knots. Lures of varying sizes were made from plastic heads with squid skirts. On occasion, two handlines were trolled with small feather jigs to catch smaller fishes.

RESULTS

Catch

Catch in number and weight by species and species group is presented in Table 1 for the 6-year period. Averaged over this period, billfishes contributed the greatest percentage by weight (55.1%), followed by tunas (29.2%) (Fig. 1). In numbers caught, tunas were the most numerous (62.3%), followed by "other" (15.3%). The "other" category includes small reef and bottom fish, which contributed little in terms of weight caught in spite of their relatively large numbers.

Blue marlin, Makaira nigricans, accounted for 85.4% by weight (15,717 kg; 34,656 lb) of the marlin catches. Yellowfin tuna, Thunnus albacares, followed the blue marlin with 5,985 kg (13,198 lb), then mahimahi, Coryphaena hippurus, 3,631 kg (8,006 lb), and skipjack tuna, Katsuwonus pelamis with 2,947 kg (6,498 lb). The best catches were made in 1980 when 1,165 fishes weighing 6,499 kg (14,331 lb) were caught.

Catch per Unit of Fishing Effort

The Mele Moku fished on 207 days in 1977, 187 days in 1978, 184 days in 1979, 182 days in 1980, 257 days in 1981, and 214 days in 1982. During the 6 years, it averaged 205.2 fishing days per year or roughly 3.9 days per week. On the average, the Mele Moku managed to catch fish on 131.7 days per year or on 64.2% of its trips.

Table 2 summarizes the catch per unit of effort of the major species in numbers and weight per day fished. Yellowfin tuna, kawakawa, Euthynnus affinis, skipjack tuna, and mahimahi had one or more annual catch rates that exceeded one fish per day during the 6-year period. The average catch rate in numbers for blue marlin was only 0.1 fish per day, tied for last with striped marlin. Tetrapturus audax, shortbill spearfish, T. augustirostris, and wahoo, Acanthocybium solandri. However, since the blue marlin

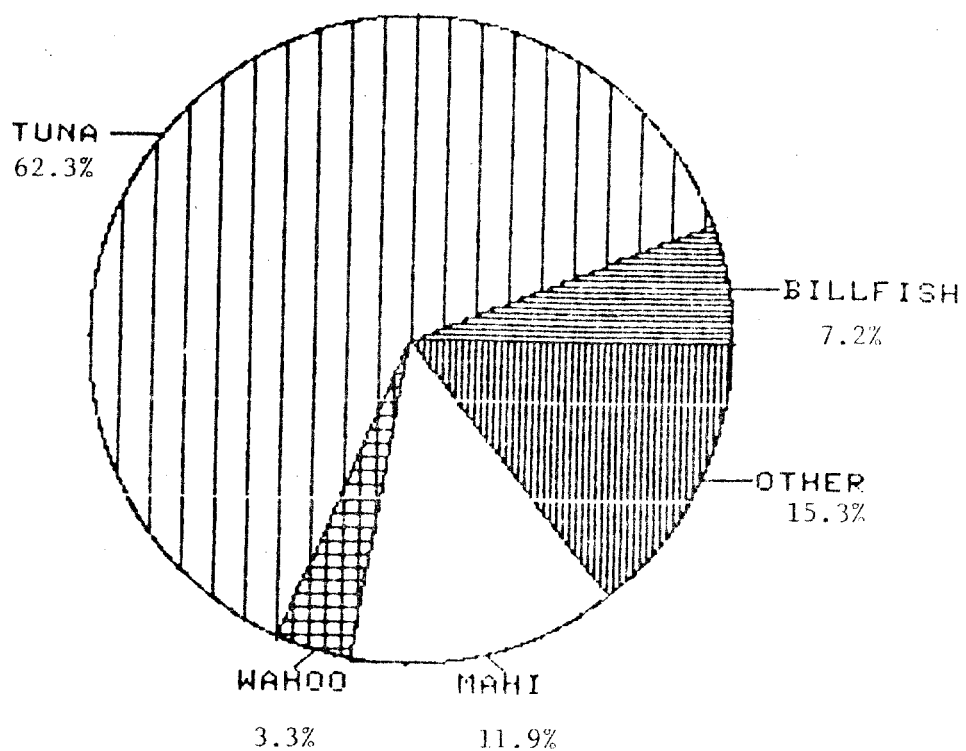
Table 1.--Mele Moku fish catches in numbers and weight, 1977-82.

Species	1977		1978		1979		1980		1981		1982		Total	
	No.	kg	No.	kg	No.	kg	No.	kg	No.	kg	No.	kg	No.	kg
Blue marlin	16	1,569	28	2,764	17	1,643	24	2,510	37	3,865	35	3,365	157	15,716
Sailfish	--	--	--	--	1	24	--	--	--	--	--	--	1	24
Shortbill spearfish	2	35	7	111	6	88	9	118	32	421	23	320	79	1,093
Striped marlin	--	--	2	50	3	75	18	428	22	546	16	410	61	1,509
Unidentified billfish	1	57	--	--	--	--	--	--	--	--	--	--	1	57
Total billfishes	19	1,661	37	2,925	27	1,830	51	3,056	91	4,832	74	4,095	299	18,399
Kawakawa	355	424	61	93	115	223	47	77	10	10	3	15	591	842
Skipjack tuna	259	565	329	1,088	86	185	305	414	202	631	20	65	1,201	2,948
Yellowfin tuna	83	459	64	1,006	44	742	478	1,565	103	1,332	44	881	816	5,985
Total tunas	697	1,448	454	2,187	245	1,150	830	2,056	315	1,973	67	961	2,608	9,775
Mahimahi	72	561	46	435	54	449	197	1,023	59	528	70	635	498	3,631
Wahoo	21	222	16	196	21	229	34	343	26	284	22	177	140	1,451
Jacks, barracuda gray snapper, and leatherjacket	89	18	188	69	122	13	53	23	122	22	65	45	639	190
Grand total	898	3,910	741	5,812	469	3,671	1,165	6,501	613	7,639	298	5,913	4,183	33,446

Table 2.--Catch of major species in numbers (N) and weight (kg) per day (D) by the Mele Moku, 1977-82.

Species	1977		1978		1979		1980		1981		1982		Average	
	N/D	kg/D	N/D	kg/D	N/D	kg/D	N/D	kg/D	N/D	kg/D	N/D	kg/D	N/D	kg/D
Blue marlin	0.1	7.6	0.1	14.8	0.1	8.9	0.1	13.8	0.1	15.1	0.2	15.7	0.1	12.6
Shortbill spearfish	<0.1	0.2	<0.1	0.6	<0.1	0.5	<0.1	0.6	0.1	1.6	0.1	1.5	0.1	0.8
Striped marlin	--	--	<0.1	0.3	<0.1	0.4	0.1	2.4	0.1	2.1	0.1	1.9	0.1	1.2
Kawakawa	1.7	2.0	0.3	0.5	0.6	1.2	0.3	0.4	<0.1	<0.1	<0.1	0.1	0.5	<0.7
Skipjack tuna	1.3	2.7	1.8	5.8	0.5	1.0	1.7	2.3	0.8	2.4	0.1	0.3	1.0	2.4
Yellowfin tuna	0.4	2.2	0.3	5.4	0.2	4.0	2.6	8.6	0.4	5.2	0.2	4.1	0.7	4.9
Mahimahi	0.3	2.7	0.2	2.3	0.3	2.4	1.1	5.6	0.2	2.0	0.3	2.9	0.4	3.0
Wahoo	0.1	1.1	0.1	1.0	0.1	1.2	0.2	1.9	0.1	1.1	0.1	0.8	0.1	1.2

Number (%)



Weight (%)

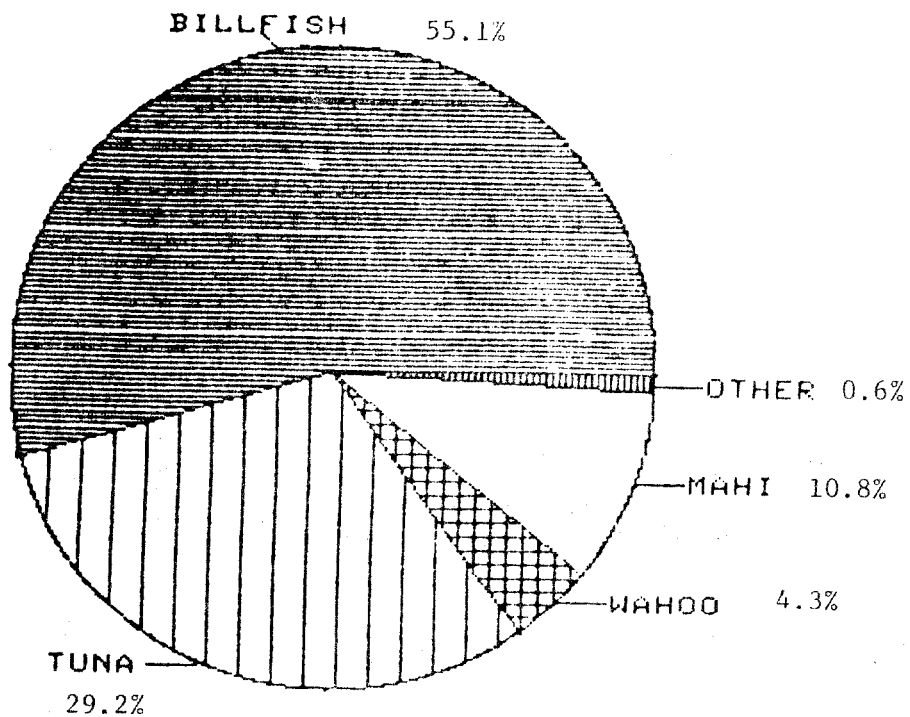


Figure 1.--Mele Moku catch percentages, average of 1977-82.

caught were large, their catch rate by weight ranged from 7.6 to 15.8 kg (16.7 to 34.7 lb) per day, the highest of any species.

Based on the number of days fished and the number of each major species caught annually, the calculated number of days it took to catch one fish for the major species caught is shown in Table 3. This measure of fishing effort ranged from 0.6 days for a kawakawa to 103.5 days for a shortbill spearfish.

The seasonal fluctuation of catch rates (number of days to catch a fish) using pooled averages is presented in Table 4 for the major fish species that were caught. The best catch rate for blue marlin was made in the third quarter, and the best for shortbill spearfish was made in the first quarter. For the striped marlin it was the first quarter, the fourth quarter for kawakawa, the second quarter for skipjack tuna, the fourth quarter for yellowfin tuna, the fourth quarter for mahimahi, and the second quarter for wahoo.

Table 3.--The number of days it took the Mele Moku to catch one fish, 1977-82.

Species	1977	1978	1979	1980	1981	1982	Average
Blue marlin	12.9	6.7	10.8	7.6	6.9	6.1	8.5
Shortbill spearfish	103.5	26.7	30.7	20.2	8.0	9.3	33.1
Striped marlin	--	93.5	61.3	10.1	11.7	13.4	¹ 38.0
Kawakawa	0.6	3.1	1.6	3.9	25.7	71.3	17.7
Skipjack tuna	0.8	0.6	2.1	0.6	1.3	10.7	2.7
Yellowfin tuna	2.5	2.9	4.2	0.4	2.5	4.9	2.9
Mahimahi	2.9	4.1	3.4	0.9	4.4	3.1	3.1
Wahoo	9.9	11.7	8.8	5.4	9.9	9.7	9.2

¹1977 was not counted in calculating this average.

Table 4.--Seasonal fluctuations of catch rates in number of days to catch a fish, pooled averages, of major fish species caught trolling by the Mele Moku, 1977-82.

Species	Jan.-Mar.	Apr.-June	July-Sep.	Oct.-Dec.
Blue marlin	16.1	9.1	5.1	7.9
Shortbill spearfish	8.0	11.0	38.6	41.6
Striped marlin	9.1	22.9	347.0	20.8
Kawakawa	3.9	6.5	1.7	1.1
Skipjack tuna	2.0	0.5	3.9	1.0
Yellowfin tuna	2.3	1.6	5.7	0.7
Mahimahi	1.9	3.4	13.9	1.2
Wahoo	13.0	4.8	8.9	22.4

Size Composition of Major Species

The average weights of the major species caught by Mele Moku for 1977 through 1982 are given in Table 5. The averages for the larger marlin, wahoo, and mahimahi are fairly representative of the size groups being caught. There was a large percentage of smaller yellowfin and skipjack tunas caught as shown in the frequency distribution by size groups (Table 6) which is reflected by the relatively low average weights of these two species (Table 5).

Table 5.--Average weights (kg) of major species caught by the Mele Moku, 1977-82.

Species	1977	1978	1979	1980	1981	1982	Average
Blue marlin	98.0	98.7	96.6	104.6	104.5	96.1	99.8
Shortbill spearfish	17.7	15.9	14.7	13.1	13.2	13.9	14.8
Striped marlin	--	25.2	24.9	23.8	24.8	25.6	¹ 24.9
Kawakawa	1.2	1.5	2.0	1.6	1.0	5.0	2.0
Skipjack tuna	2.2	3.3	2.2	1.4	3.1	3.3	2.6
Yellowfin tuna	5.5	15.7	16.9	3.3	12.9	20.0	12.4
Mahimahi	7.8	9.4	8.3	5.2	9.0	9.1	8.1
Wahoo	10.6	12.2	10.9	10.1	10.9	8.0	10.4

¹1977 was not counted in calculating this average.

Table 6.--Size-frequency distribution, by weight categories (kg), of the major fish species caught by the Mele Moku, 1977-82. Only individual weights were used; aggregate weights of two or more individuals were not included.

Year	Blue marlin							
	0-45	46-91	92-136	137-181	182-227	228-272	273-317	>317
1977	--	12	1	--	1	--	--	1
1978	2	17	4	3	1	--	1	--
1979	--	21	5	1	--	--	--	1
1980	--	16	9	5	2	2	--	--
1981	--	17	10	11	--	--	--	--
1982	4	24	9	1	4	1	1	--

Year	Shortbill spearfish					
	0-4.5	4.6-9.0	9.1-13.5	13.6-18.0	18.1-22.5	22.6-27.0
1977	--	--	1	--	--	1
1978	--	--	3	3	1	--
1979	--	1	2	3	--	--
1980	--	3	1	2	1	--
1981	--	6	16	8	2	--
1982	--	3	10	8	3	--

Year	Striped marlin		
	0-23	24-46	47-69
1977	--	--	--
1978	1	1	--
1979	4	2	--
1980	17	8	1
1981	11	12	--
1982	9	5	2

Year	Yellowfin tuna					
	0-23	24-46	47-69	70-92	93-115	116-138
1977	8	--	--	1	1	--
1978	10	--	2	4	3	--
1979	13	--	2	6	1	--
1980	12	2	7	10	2	1
1981	18	--	10	3	1	--
1982	15	2	11	1	--	--

Table 6.--Continued.

Year	Wahoo					
	0-4.5	4.6-9.0	9.1-13.5	13.6-18.0	18.1-22.5	22.6-27.0
1977	--	7	4	--	1	1
1978	--	4	5	2	1	--
1979	--	6	8	1	--	2
1980	--	14	6	3	1	1
1981	1	9	8	6	--	--
1982	6	8	11	1	--	--

Year	Mahimahi					
	0-4.5	4.6-9.1	9.2-13.6	13.7-18.1	18.2-22.7	22.8-27.2
1977	10	5	15	4	1	--
1978	4	5	10	5	2	--
1979	8	16	9	2	--	1
1980	4	6	19	7	1	1
1981	4	14	17	3	2	1
1982	7	20	21	7	--	--

Year	Skipjack tuna				
	0-2.0	2.1-4.0	4.1-6.0	6.1-8.0	8.1-10.0
1977	19	7	4	1	--
1978	3	1	1	--	1
1979	9	1	1	1	--
1980	14	3	1	1	2
1981	19	3	1	--	1
1982	14	8	1	1	--

Year	Kawakawa		
	0-1.0	2.1-4.0	4.1-6.0
1977	23	3	--
1978	14	--	--
1979	11	3	2
1980	11	3	3
1981	6	1	--
1982	--	2	1

Appendix A.--Mele Moku catches (kg) from April 1979 through December 1982.
Includes data from all trips taken by all captains.

Species	1979		1980		1981		1982	
	No.	kg	No.	kg	No.	kg	No.	kg
Blue marlin	28	2,555	35	3,699	38	4,037	44	4,355
Sailfish	1	24	1	32	--	--	--	--
Shortbill spearfish	6	88	9	118	32	421	24	333
Striped marlin	6	138	28	623	23	582	16	410
Total billfishes	41	2,805	73	4,472	93	5,040	84	5,098
Kawakawa	145	226	55	77	10	10	3	15
Skipjack tuna	88	202	309	448	203	634	26	78
Yellowfin tuna	57	770	508	2,437	103	1,332	48	896
Mixed yellowfin and skipjack tunas	--	--	--	--	--	--	28	83
Total tunas	290	1,198	872	2,962	316	1,976	105	1,072
Mahimahi	75	488	228	1,022	63	567	79	732
Wahoo	28	229	50	361	26	284	29	238
Miscellaneous species	3	8	6	23	14	26	13	47
Grand total	437	4,728	1,229	8,840	512	7,893	310	7,187

Appendix B.--Catch of major species in numbers (N) and kilograms (kg) per day (D) by the Mele Moku, 1979-82. These data include trips made by all captains. The total number of fishing days are shown in parentheses.

Species	1979(246)		1980(295)		1981(267)		1982(284)	
	N/D	kg/D	N/D	kg/D	N/D	kg/D	N/D	kg/D
Blue marlin	0.1	10.4	0.1	12.5	0.1	15.1	0.2	15.3
Shortbill spearfish	<0.1	0.4	<0.1	0.4	0.1	1.6	0.1	1.2
Striped marlin	<0.1	0.5	0.1	2.1	0.1	2.2	0.1	1.4
Kawakawa	0.6	0.9	0.2	0.3	<0.1	0.1	<0.1	0.1
Skipjack tuna	0.4	0.8	1.0	1.5	0.8	2.4	0.1	0.3
Yellowfin tuna	0.2	3.1	1.7	8.2	0.4	5.0	0.2	3.2
Mahimahi	0.3	2.0	0.8	3.4	0.2	2.1	0.3	2.6
Wahoo	0.1	1.0	0.2	1.2	0.1	1.0	0.1	0.8